89-166980/23 J01 **NORT 03.12.87**
*EP -318-934-A
NORTON CO
03.12.87-US-128558 *(07.06.89)* B01d-46/02 B01d-53/36
Gas treatment system using double filter bags filled with catalyst - gives simultaneous dust removal and catalytic gas clean-up in bag house
C89-074086 R(AT BE CH DE FR GB IT LI NL)

J(1-E3F, 1-G3)

A twin-walled filter bag is used in a conventional baghouse to remove dust from gas streams. Catalyst particles contained in the spece between the bags allow simultaneous gas treatment e.g. selective catalytic reduction of nitrogen oxides.

The bag is made by fastening together an inner and an outer bag by e.g. stitching, welding, stapling, bonding. Catalyst is carried in the space between the bags.

USE/ADVANTAGE

Bag provides simultaneous dust removal and tailgas cleanup (e.g. removal of nitrogen oxides, carbon monoxide, hydrocarbons). Plant is more compact and retrofitting is simple.

EMBODIMENTS

The bags may be used in conventional hot baghouses, with cleaning by mechanical shaker or reverse-jet action. The inner bag should be rigid (to withstand the external pressure when operating) for a reverse-jet filter.

Bags may be of e.g. woven wire, fibreglass, ceramic fibres, woven or nonwoven fabric depending on application. Catalyst may be of any shape e.g. granules, powders, spheres, discs, extrudates, tablets or rings.(5pp1966RBH DwgNo0/4).
(E) ISR: No Search Report.

EP-318934-A

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: 0 318 934
A2

(12) EUROPEAN PATENT APPLICATION

(21) Application number: 88119910.3

(22) Date of filing: 29.11.88

(51) Int. Cl.[4]: B01D 46/02 , B01D 53/36

(30) Priority: 03.12.87 US 128558

(43) Date of publication of application:
07.06.89 Bulletin 89/23

(84) Designated Contracting States:
AT BE CH DE FR GB IT LI NL

(71) Applicant: NORTON COMPANY
1 New Bond Street
Worcester, MA 01606-2698(US)

(72) Inventor: Szymznski, Thomas
2937 East Celeste View Drive
Stow Ohio 44224(US)
Inventor: Turner, Stephen M.
1907 Legacy Court
Richmond Texas 77469(US)

(74) Representative: Baillie, Iain Cameron et al
c/o Ladas & Parry Isartorplatz 5
D-8000 München 2(DE)

(54) Bag for removal of solid material from gases and for treatment of said gases.

(57) A bag for the removal fo solid particulate matter from a gas stream and for the simultaneous treatment of said gas stream, said bag having an inner porous wall and an outer porous wall with space between said walls, said walls being positioned to have an inlet side and an outlet side, and solid particulate catalyst contained in the space between said inner and outer walls.

EP 0 318 934 A2

The present invention relates to a bag for the removal of solid material from gases and for the simultaneous treatment of said gases.

Many industrial processes produce flue gas streams which require particulate removal and/or catalytic tailgas clean-up prior to releasing them to the atmosphere. A typical example would be a coal-fired power plant in which the fly ash must be removed prior to the exhaust gas leaving the smoke stack. The increased public awareness of the "acid rain" problem has increased the desire to reduce acid rain forming flue gas components such as sulfur oxides (SO_x) and nitrogen oxides (NO_x) from the exhaust gas as well as the fly ash. In fact, several European countries have instituted mandatory SO_x and NO_x controls.

The current method of removing particulates such as fly ash as well as gaseous pollutants such as NO_x employs several different processes in series. If one, for example, combines the separate processes of particulate and NO_x removal into one, it obviously offers distinct advantages in terms of size, ease of retrofitting, etc.

We have discovered an improved bag design for use in a hot baghouse. This discovery, for example, allows the simultaneous removal of particulates such as fly ash and with the addition of ammonia and a selective catalytic reduction (SCR) catalyst, NO_x.

Pirsch teaches in U.S. Patent 4,220,633 a process for the simultaneous removal of NO_x and particulate matter from a gas stream where the catalyst may be incorporated into or onto the filter fabric. This is a costly process and the necessity of frequent cleaning of filter bags and their dusty process environment can lead to catalyst being removed form the bag.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings, Figure 1 is a side view, partly in cross-section, of a filter bag of the invention.

Figure 2 is a cross-sectional view to show the construction of a baghouse employing filter bags of the present invention.

Figure 3 is a view, like Figure 1, of a modified form of the bag of the present invention.

DESCRIPTION OF THE INVENTION

Our discovery involves a novel and inexpensive catalytic filter bag. This invention consists of two bags, one inside the other, attached to each other by any method known to those skilled in the art such as stitching, stapling, adhesives, solvent welding, snaps, zippers, etc. The channels so formed can be varied in size by appropriate adjustment of the bags and seam widths. After manufacture and prior to installation the bags can be filled with the catalyst specific for the reaction desired. The catalyst can be in any shape such as powder, granules, extrudates, tablets, spheres, rings, discs, or other shapes known to those skilled in the art.

The bags of this invention are easily manufactured and filled with catalyst for the intended applications. Examples of such catalysts and applications are well known by those skilled in the art. Two typical examples would be the selective catalytic reduction of NO_x using ammonia and the catalytic incineration of carbon monoxide (CO) and lower hydrocarbons. The bags of this invention are not limited to these two examples and are of broad utility.

The bags may be constructed of woven wire, fiberglass cloth, woven or non-woven polymeric and/or ceramic fibers, or other suitable fabrics capable of withstanding the temperatures of the flue gas and processing conditions. Thus, the bags of this invention allow the simultaneous removal of particulates as well as the potential to remove gaseous contaminants such as NO_x. This invention yields a more compact total installation as it eliminates the need for one or more pieces of process equipment.

Figure 1 shows a bag of the invention in a tubular form, partly in cross-section. Catalyst pellets 11 are contained between outer wall 12 and inner wall 13. Compartments are formed by attaching the walls together at spaced distances along its axis as shown at 14, 14′, 14″ and 14‴, etc. If desired longitudinal attachment or stitching may be employed to further compartmentalize the space between the walls.

Figure 2 shows a conventional baghouse except for the use of the bags of this invention and illustrates how the bags of the present invention can be employed. The bags 21 are enclosed in a housing 22. The bags supported at their tops by mechanism 23 which is adapted to shake the bags periodically to remove the dust collected, which is removed from the bottom of hopper 24. The inlet gas enters inlet pipe, baffle 26 diverts the inlet air into annular headers to which the insides of the bags 21 are exposed. The cleaned air exits the outside wall of the bags and then exits the outlet pipe 28.

Figure 3 shows a slightly modified type of bag 30 designed for use in a baghouse where the flow through the bag is outside-in, as illustrated in Figure4. The outer wall 31 of bag 30 is of fine mesh, suitable for the filtration application while the inner wall 32 is relatively stiff and has meshes

coarse enough to retain the catalyst, and stiff enough to maintain the geometry of the bag against gas pressure from the outside. In addition the compartments for the catalyst may be formed by, for example, wrapping and tying a cord 33 around the outside of the bag as each section of the bag is filled with particulate catalyst before installation in the baghouse.

Figure 4 shows a baghouse or bag filter assembly suitable for the bags of Figure 3. The gas enters inlet 41, goes through first the outer wall of bags 30 and exits the beader 42 at the top of the assembly to which open ends of the bags communicate. The bottom ends of the bags are obviously closed. The dust may be periodically removed from the bags by pulsing compressed air through valves 43 and nozzles 44. The dust is collected in hopper 44 and can be removed by operation of valve 45.

Claims

1. A bag for the removal of solid particulate matter from a gas stram and for the simultaneous treatment of said gas stream, said bag having an inner porous wall and an outer porous wall with space between said walls, said walls being positioned to have an inlet side and an outlet side, and solid particulate catalyst contained in the space between said inner and outer walls.

2. A bag according to claim 1, in which the walls are made of a fabric having mesh openings, the mesh openings in the outlet side being finer than the mesh openings on the inlet side.

3. A bag according to claim 1 or 2, in which the space between the walls is compartmentalized to prevent catalyst migration.

4. A bag according to any one of the preceding claims, in which the outer wall is relatively supple and the inner wall is relatively stiff, whereby the inner wall rigidifies the bag structure and the outer wall can be deformed to provide compartments for the catalyst.

5. A baghouse for simultaneously removing particulate solids and treating a gas stream wherein filter bags are provided having double walls between which is enclosed a solid catalyst.

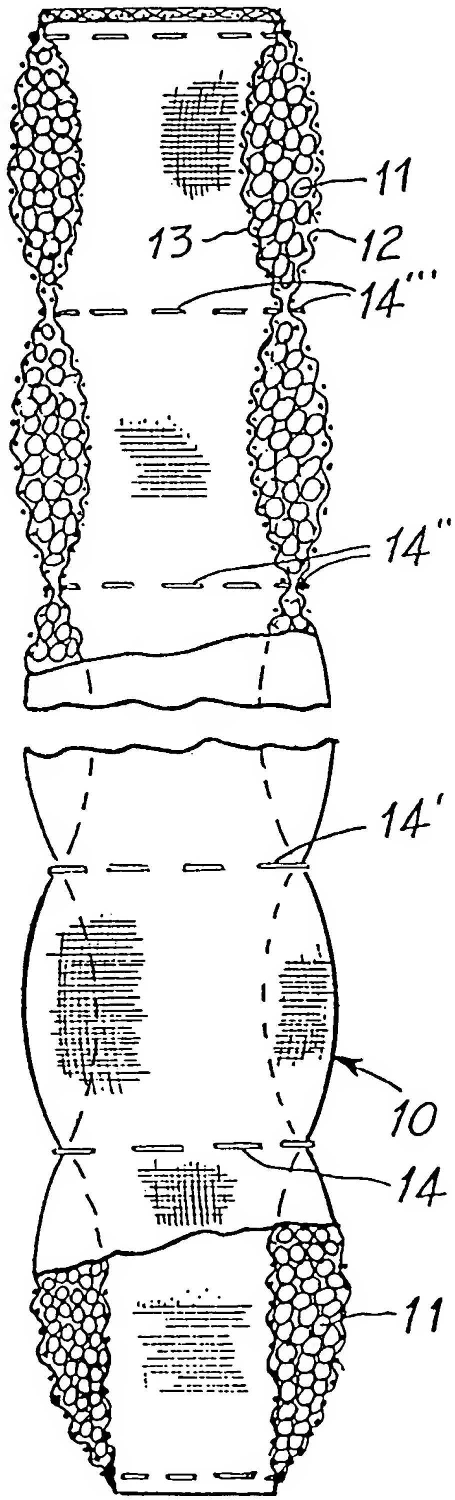

FIG. 1

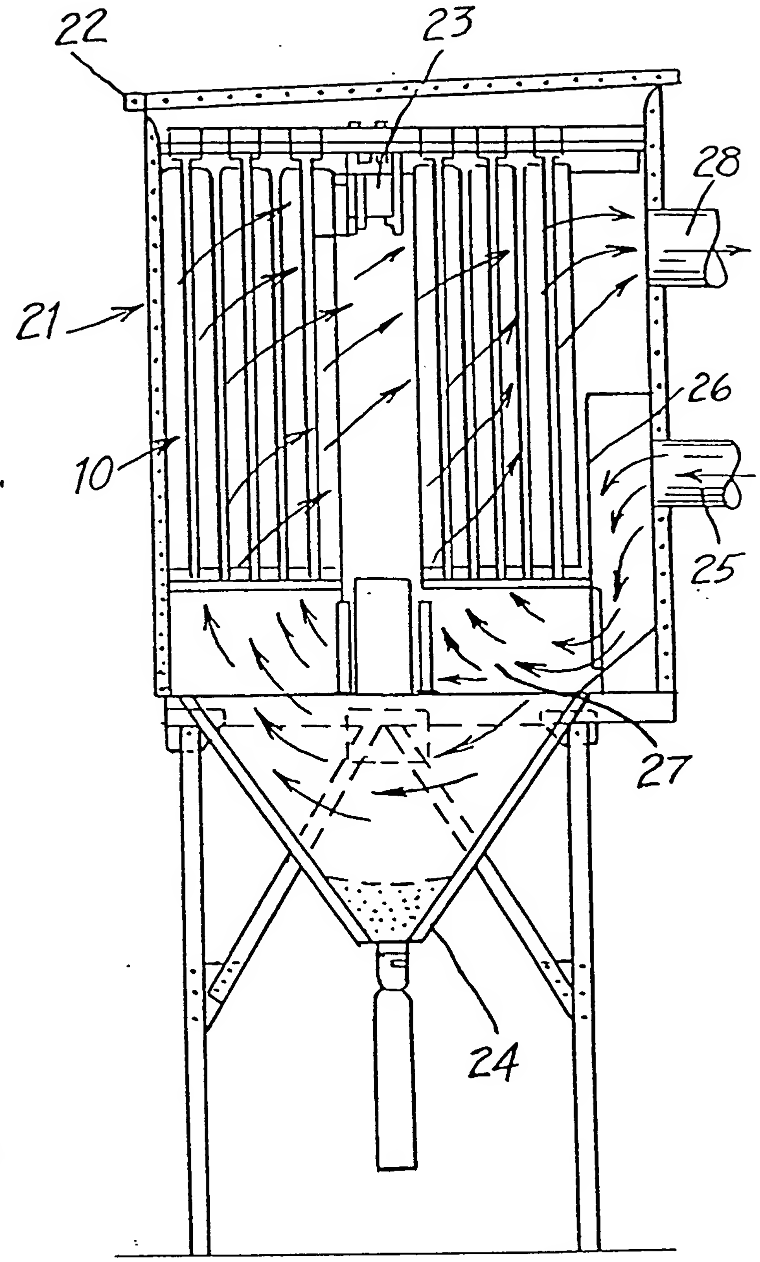

FIG. 2

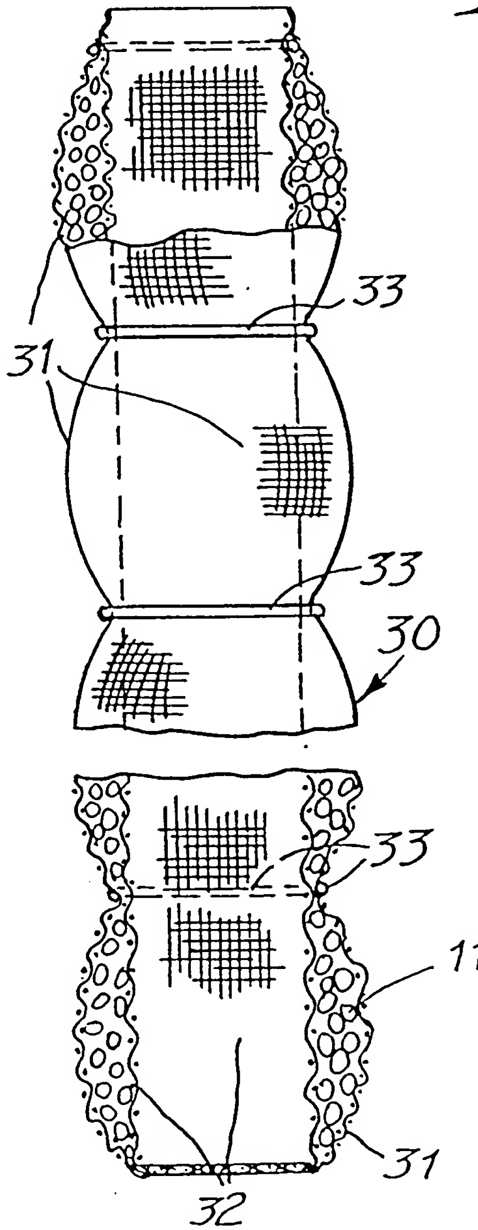

FIG.3

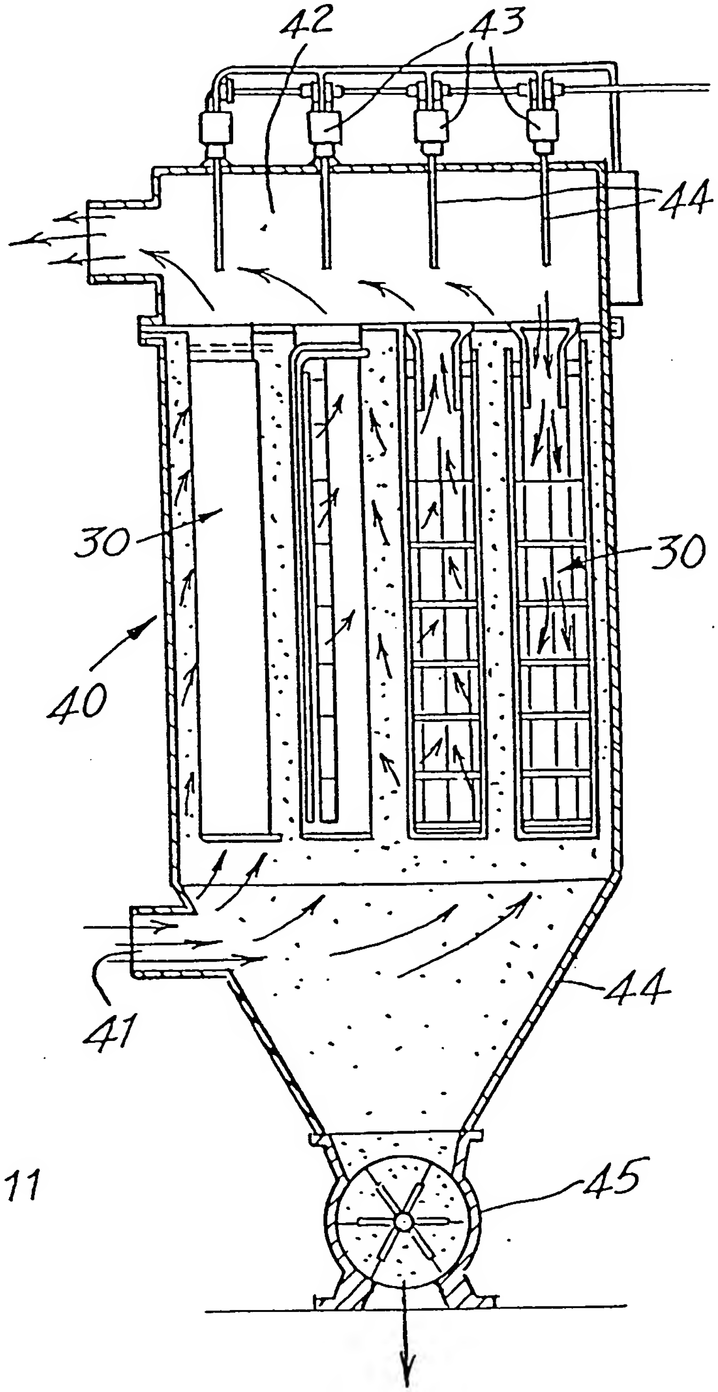

FIG.4